Stabpac

THIS SPECIFICATION IS APPROVED
FOR USE IN THE CALIBRATION OF
COMPANY INSTRUMENTS.
9
CALIBRATION DEPARTMENT
QC FACILITIES R Hearne DATE: 3-2-80
BRITISH AIRCRAFT CORPORATION, STEVENAGE.

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MP MASTER
MA23761

Stabpac

Thermal insulation

The STABPAC is mainly constructed from anodised aluminium extrusion which acts as a heat sink for the heat producing components. The use of these extrusions, separated by heat insulators, results in small dimensions despite the requirement of withstanding high ambient temperatures (up to 60°C).
These insulators prevent the heat generated by the power transistors and transformer from being conducted to the more delicate and sensitive components. This method of construction is a strong contributory factor to the long life of the STABPAC and is a very important feature for modular units.

Controls

The voltage setting is adjustable by a screwdriver and is fitted with a potentiometer lock. Current limiting is also adjustable in a similar manner but deliberately made more difficult to prevent tampering.

Resistors

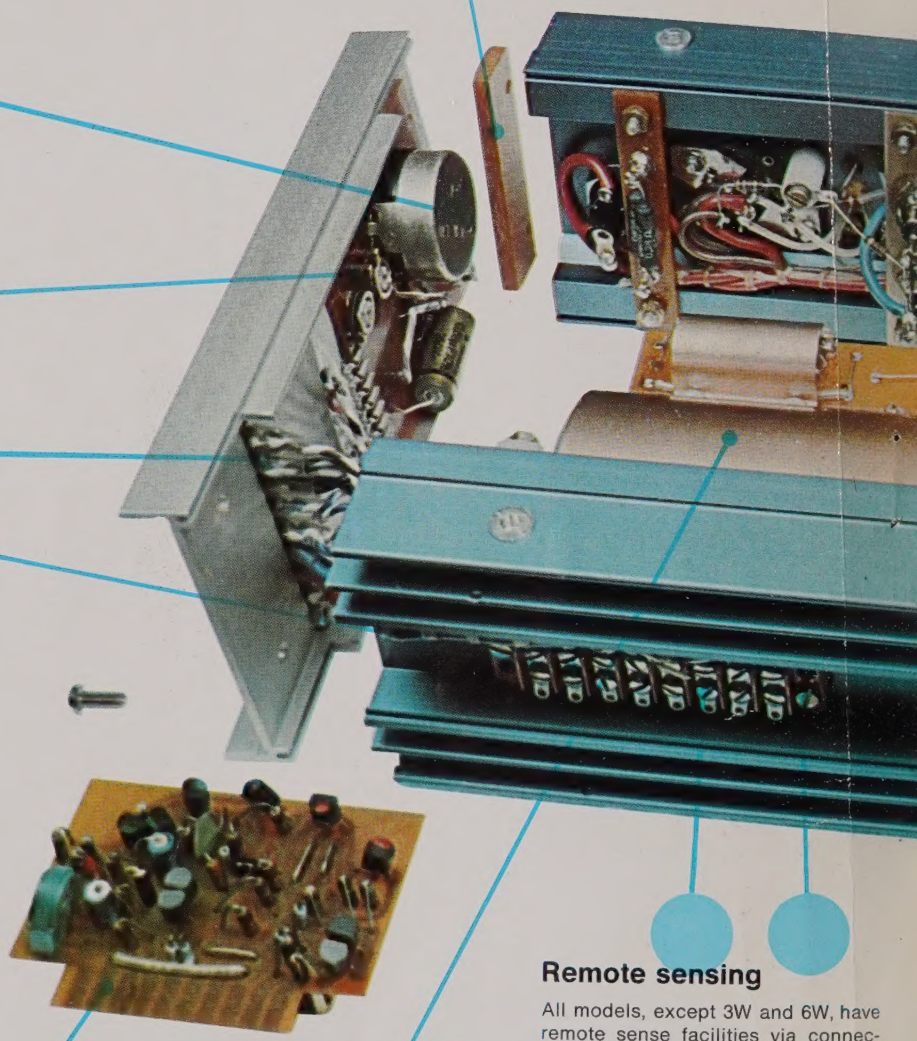
Metal film resistors are used for the voltage regulation circuits to ensure the best possible stability.

Output connections

All STABPACS from 15W and upwards are fitted with 2 barrier terminal strips so that connections can be made in 2 separate places. This is of considerable advantage during installation.

Component location

STABPAC components are arranged in "hot" and "cool" sections. The heat-producing components, power transistors, transformer and rectifier diodes, are all located in the "hot" section and are separated by a heat insulator from the "cool" section which contains the components sensitive to heat. By this arrangement heat is not conducted into areas where it can affect equipment performance.



Stability

All STABPAC models, with the exception of 3W and 2 X 30W, can be supplied in 2 different stability groups, 0.01 %, 0.1 % and 0.25 % (B, C & D plug-in cards respectively).
The B-card has matched input transistors and selected reference diodes to obtain the minimum drift and temperature coefficient.
A secondary consideration is that servicing is simplified by the use of plug-in cards.

Cooled electrolytic capacitor

One reason for the STABPAC's high temperature specification is that the electrolytic capacitors are surrounded by cooling shields which protect them from the heat radiated by other components. The importance of this is evident from the manufacturers' statements that the life of electrolytic capacitors are reduced by 50 % for every 7°C rise in temperature.

Remote sensing

All models, except 3W and 6W, have remote sense facilities via connections on the terminal strips. The load regulation is not affected as long as the voltage drop in each line to the load is below 0.5V.

Programming

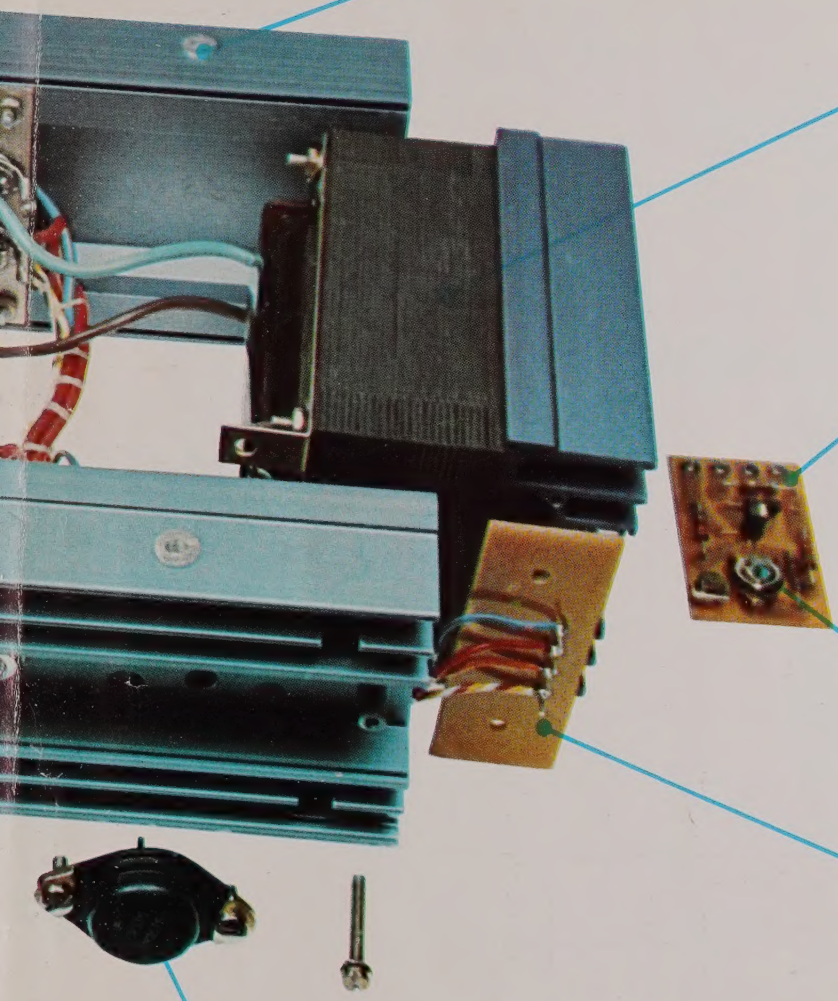
All STABPACS, except 3W and 2 X 30W, are remotely programmable via contacts on the terminal strips. The programming constant is 300 ohms/V.

Profiles

Specially designed cooling extrusion with high heat dissipation is an integral part of the metal construction.

Mounting arrangements

All STABPACS are easy to install due to well positioned mounting holes on all four sides. These holes are tapped for either M3 or M4 metric screws depending on the model. All models are fitted with dust covers.



Transformer

The transformer is vacuum impregnated and made from grain oriented magnetic material. It has 2 electrostatic screens and is mounted directly onto the cooling extrusion. This efficient method of cooling increases the transformer life considerably.

Overvoltage protection

All models, except 3W & 6W, are prewired for fitting of an overvoltage protection unit (OVP). This unit can be installed before delivery or backfitted at a later date. Overvoltage protection means that one never needs to be afraid of ruining sensitive and expensive circuitry in the event of a failure or overvoltage.

Overvoltage adjustment

All types of OVP have a simple adjustment for voltage limitation.

Thermal insulation

The STABPAC is constructed from aluminium extrusion separated by insulating material.

Plug-in semiconductors

The STABPAC is designed for ease and simplicity of servicing and uses some plug-in semiconductors to facilitate quick and easy replacement.

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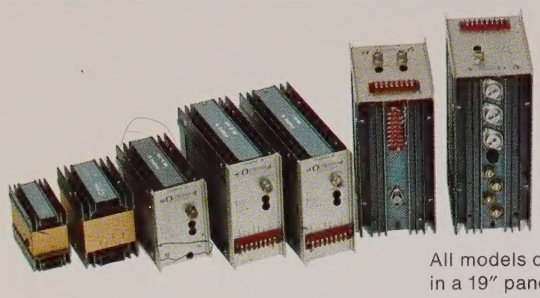
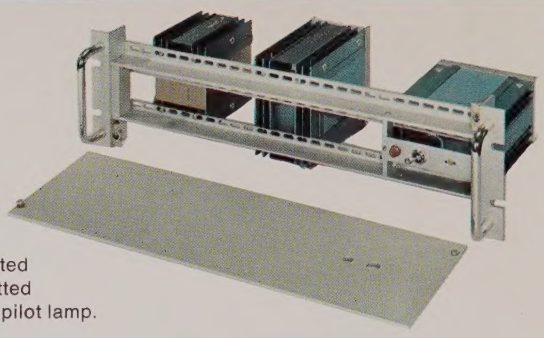
Stabpac





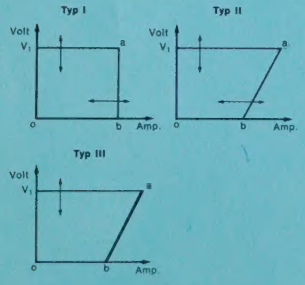
All models can be mounted in a 19″ panel adapter fitted with a mains switch and pilot lamp.

Line Regulation (10 % mains swing)	Model	Type No.	DC Output Volt	DC Output Amp. b–a	Load Regulation (100 %) mV	Ripple and Noise mV RMS	V/I Characteristic	Dimensions H × W × D mm	Weight kg
0.01 %	STABPAC 3 3 W	2MB15-01*	2x15	0.1**	10	0.3	I	78.5x50x95	0.6
		MB15-0.2	0–15	0.2–0.2					
		MB30-0.1	0–30	0.1–0.1					
	STABPAC 6 6 W	MB5.5-1	5–6	0.5–1	20	0.3	II	96x71x101	1.1
		MB8-0.75	0–8	0.5–0.75					
		MB15-0.4	0–15	0.27–0.4					
		MB32-0.2	0–32	0.13–0.2					
	STABPAC 15 15 W	MB5.5-2	5–6	1–2	20	0.5	II	112x71x145	1.4
		MB8-1	0–8	1–1					
		MB15-1	0–15	0.66–1					
		MB32-0.48	0–32	0.32–0.48					
		MB60-0.25	0–60	0.17–0.25					
	STABPAC 30 30 W	MB8-2	0–8	2–2	20	0.5	II	148x71x180	2.2
		MB15-2	0–15	1.35–2					
		MB32-0.95	0–32	0.65–0.95					
		MB60-0.5	0–60	0.35–0.5					
		MB120-0.25	0–120	0.17–0.25					
	STABPAC 2x30 2x30 W*	2MB12-2	2x10.8–13.2	2 **	20	0.5	II	148x99x210	4.1
		2MB15-1.8	2x13.5–16.5	1.8**					
		2MB30-1	2x25.0–31.0	1 **					
	STABPAC 45 45 W	MB5.6-5	4.5–6.3	5 **	20	0.5	II	148x71x210	2.9
		MB12-3.5	10.8–13.2	3.5**					
		MB24-1.8	21.6–26.4	1.8**					
		MB28-1.6	25.0–31.0	1.6**					
	STABPAC 90 90 W	MB5.6-10	4.5–6.3	10 **	20	0.5	II	160x99x240	5.0
		MB12-7.5	10.8–13.2	7.5**					
		MB24-3.7	21.6–26.4	3.7**					
		MB28-3	25.0–31.0	3 **					
		MB48-1.9	43.2–52.8	1.9**					
0.1 %	STABPAC 45 45 W	MC5.6-5	4.5–6.3	5 **	50	1	II	148x71x210	2.9
		MC12-3.5	10.8–13.2	3.5**					
		MC24-1.8	21.6–26.4	1.8**					
		MC28-1.6	25.0–31.0	1.7**					
	STABPAC 90 90 W	MC5.6-10	4.5–6.3	10 **	50	1	II	160x99x240	5.0
		MC12-7.5	10.8–13.2	7.5**					
		MC24-3.7	21.6–26.4	3.7**					
		MC28-3	25.0–31.0	3 **					
		MC48-1.9	43.2–52.8	1.9**					
0.25 %	STABPAC 6 6 W	MD5.5-1	5–6	0.5–1	100	2	III	96x71x101	1.1
		MD8-0.75	0–8	0.5–0.75					
		MD15-0.4	0–15	0.27–0.4					
		MD32-0.2	0–32	0.13–0.2					
	STABPAC 15 15 W	MD5.5-2	5–6	1–2	100	2	III	112x71x145	1.4
		MD8-1	0–8	1–1					
		MD15-1	0–15	0.66–1					
		MD32-0.48	0–32	0.32–0.48					
		MD60-0.25	0–60	0.17–0.25					
	STABPAC 30 30 W	MD8-2	0–8	2–2	100	2	III	148x71x180	2.2
		MD15-2	0–15	1.35–2					
		MD32-0.95	0–32	0.65–0.95					
		MD60-0.5	0–60	0.35–0.5					
		MD120-0.25	0–120	0.17–0.25					

Other voltage ranges can be quoted on request.

* Negative and positive output with common zero.
** ″b″ corresponds to the shortcircuit current which is about 1/3 of rated current.

Voltage-current characteristics



Maximum current is limited by the line a–b. When the unit is despatched from the factory points a & b are set 10 % above the values quoted in the above table.

Type I is adjustable down to 10 % of the load current.

Type II has points a & b individually adjustable and may be set at the same value, ie those that give a straight current limit as in Type I. On no account should the points a & b be set to exceed the values given in the table + 10 %.

Type III has a factory pre-set current limit.

Input: 200–240V, 50–60 Hz.

Output: Floating. Either positive or negative terminal may be grounded. Voltage is continuously adjustable within the ranges stated above.

Recovery time: Typically 20 μSecs (slightly higher on 90W models).

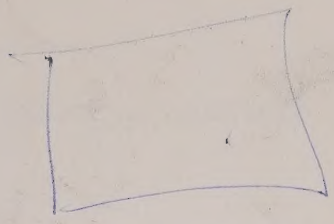
Long term stability: Typically 0.01 %/day for the MB models.

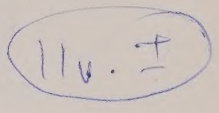
Temperature drift: Typically 0.005 %/°C for the MB models.

Ambient temperature: 0–60°C (most models will work down to –10°C even without the effect of self-generated heat).

Storage temperature: –55 to +70°C.

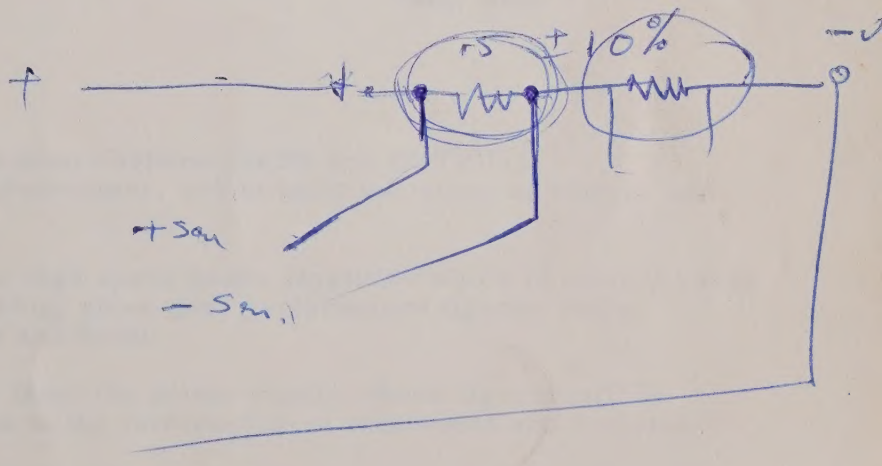
Chassis insulation voltage: 1000V.





STABPAC 15

Ser. nr.



NORMAL OPERATION

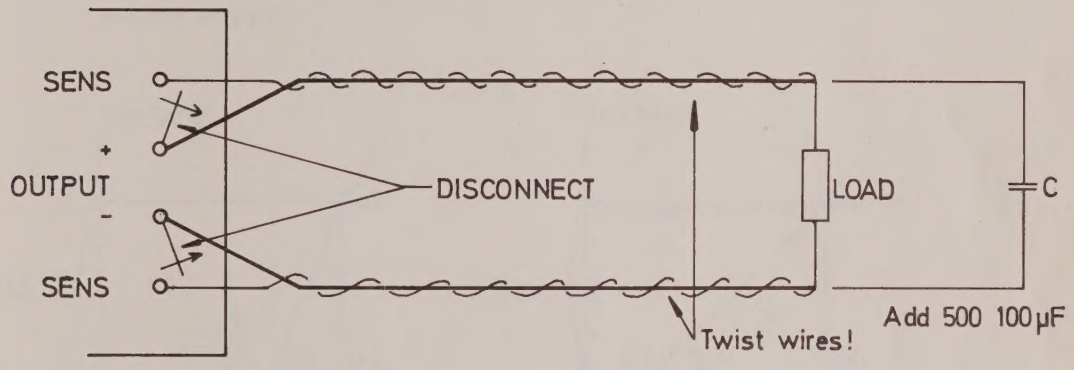
Connect "+SENS" to "+OUTPUT" and "-SENS" to -OUTPUT

REMOTE SENSING STABPAC

(For STABPAC 2 x 30, see special instructions)

In order to facilitate mounting of STABPAC on convinient remote locations, compensation for voltage drops in the wires can be compensated for by using remote sensing.

This is done by connecting the SENS terminals to the load.



Do not forget to disconnect between SENS and OUTPUT.
Normally no other precautions, but to twist the wires as shown, are needed.

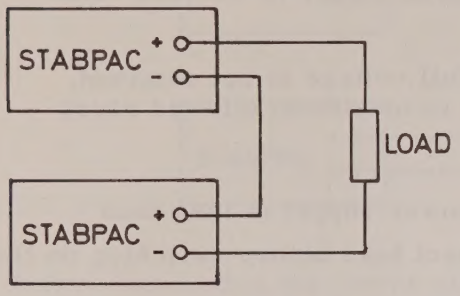
STABPAC contains a high speed sense amplifier which in normal cases (without remote sensing) gives good performance figures while switching the load to and from.

With extended wires from the power supply, those figures will be slightly distorted due to the introduction of inductance and resistance with the wires.

It is easy to compensate for this by adding at least a 50 µF electrolytic capacitor over the load.

SERIES CONNECTION OF STABPAC´s

To obtain a higher output voltage STABPAC´s may be connected in parallell only observing that the max voltage to ground not exceeds 500 volts.



Note: Due to the foldback type current limit the expected voltage may not be achieved if the load is connected when switching on the power supply.

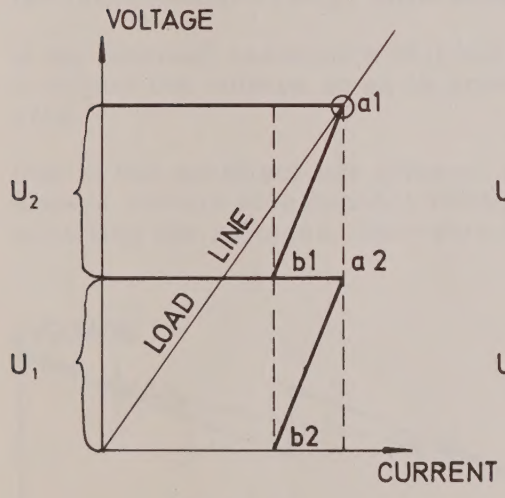


Fig.1

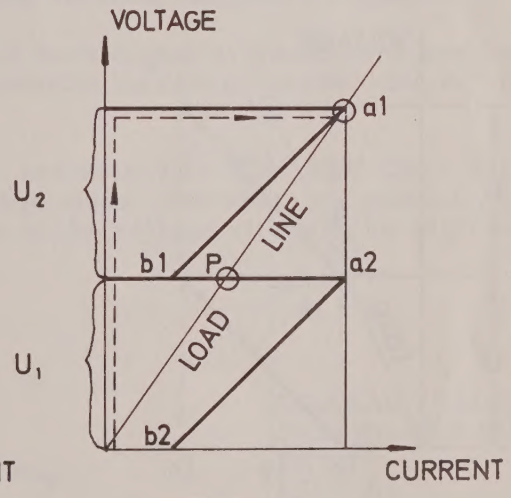


Fig.2

(See Fig 1 and Fig 2)

The voltage of one power supply might come up first and then will the current limit of the other power supply engage and give 0 voltage output. The situation is shown in fig 2, point P.

Note that a very short time (without load) is needed in order to let both power reach full voltage before connecting the load. Then the dashed line (in fig 2) will be followed and you will be inside the safe operating area.

In the case of fig 1 the load line will always be inside safe operating area and the load may then be connected all the time.

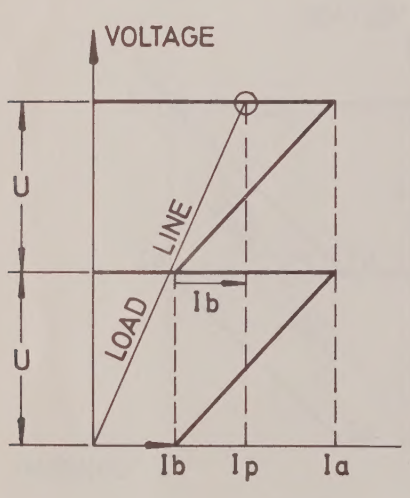
If the load is connected <u>after</u> switching on the power supplies full voltage will appear.

If the load is connected <u>before</u> switching on the power supplies check the following points: (See fig 1 and fig 2).

1. If a number N power supplies are connected in series check that shortcircuit current (b) in every power supply is not less than $(1-\frac{1}{N})$ x maximum current (a).
2. If, although (1) has been checked, full voltage is not obtained, adjust (if possible) potentiometer <u>b</u> to maximum allowed short-circuit current.
   Also check current limit <u>a</u>.
3. If shortcircuit current (b) for any power supply is less than $(1-\frac{1}{N})$ x maximum current (a); connect load before switching on the power supplies.

<u>How much current can be drawn with load connected when switching on the power supplies?</u>

(See fig 3 below)



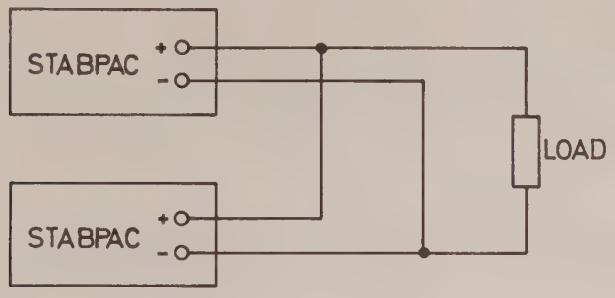
The permissible current (Ip) for this case, with two STABPAC´s in series is as can be seen in fig 3, 2 x Ib. If Ib is more than 1/2 Ia, Ia will of course be the limit.

Example	AMP a	AMP b	Ip=2xIb	Max. perm. current	% of Max. Load
STABPAC 6 MB32-0,2	0,13	-0,2	0,26	0,2	100 %
STABPAC 15 MB15-1	0,66	-1	1,32	1	100 %
STABPAC 30 MB60-0,5	0,35	-0,5	0,70	0,5	100 %
STABPAC 45 MB24-1,8	($\frac{1}{3}$x1,8)	-1,8	1,2	1,2	66 %
STABPAC 90 MB28-3	($\frac{1}{3}$x3)	-3	2	2	66 %

It may be noted that current limit is factory adjusted to 10 % above specified value.

PARALLELL CONNECTION OF STABPACS

STABPACS may be connected in parallell to give higher output current.

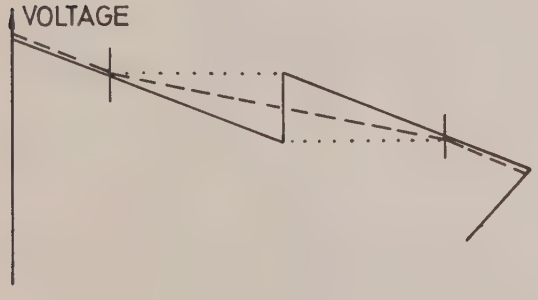


Before connecting the power supplies, adjust to equal voltage. Of course there will always remain a slight incremental voltage difference between the different power supplies. If the load is gradually increased, the power supply with the highest voltage will deliver all the current until it reaches its current limit. Then the voltage will drop slightly and the other power supply will begin to deliver current.

There will then appear a very small voltage step of the same value as the incremental voltage difference between the power supplies.

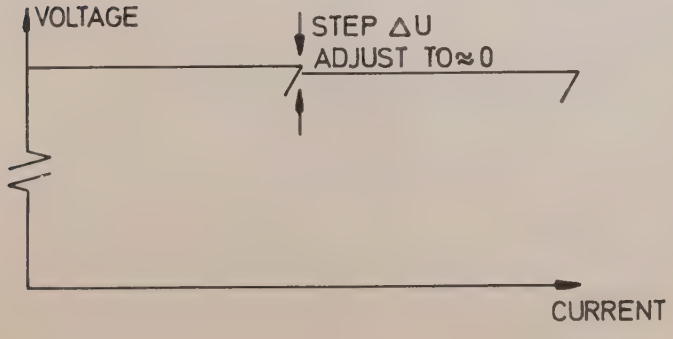
If the internal resistance (Ri) had been higher it would have been possible to adjust the voltage so as to gradually increase current with no voltage step.

Due to the excellent low internal resistance in STABPAC there will always remain incremental voltage steps. However, by carefully adjusting the voltages, the value of the voltage step will be neglible.



CHARACTERISTIC
FOR POWER SUPPLY
WITH
HIGH R_i

---- NO STEPS



STABPAC
CHARACTERISTIC

LOW R_i

How to calculate and use the programming resistor

1. Use VOLT. ADJUSTMENT knob to set lowest desired programmed voltage.

   Observe! Only STABPAC 15 and 30 can be set to zero (0) voltage. STABPAC 45 and 90 may not be set outside specified voltage range.

2. It is now possible to add voltages to the voltages set according to 1. above. The added voltage will be obtained by adding programming resistors.

3. To calculate programming resistors use 300 Ohm for one added volt (300 Ohm/volt.)

4. Check that the highest programmed voltage is within the specified range.

Example:

STABPAC 15 MB8-1

Desired Voltages: 2, 4 and 8 volt

Set VOLT. ADJUSTMENT to 2 volt.

Programming resistors will be:

(4-2) x 300 = 600 Ohm and (8-2) x 300 = 1800 Ohm.

REMOTE PROGRAMMING

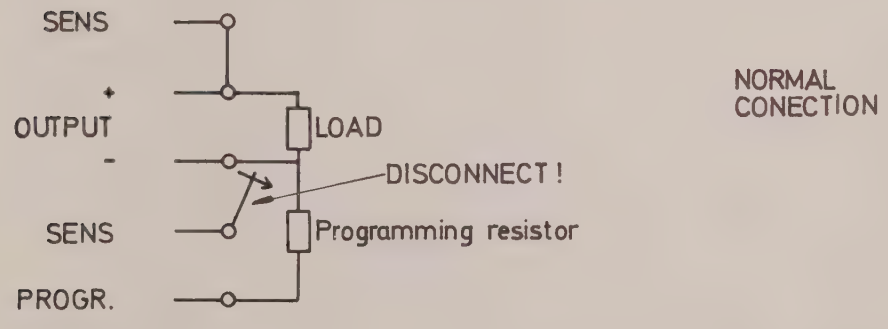
All STABPAC models can be remotely controlled over the entire voltage range except the 2 x 30 models.

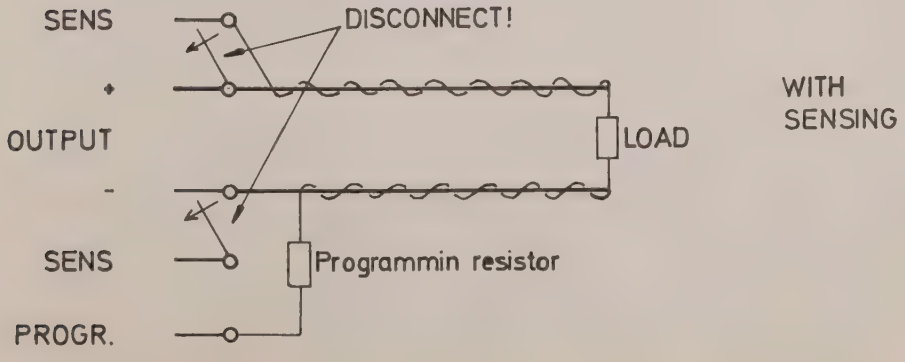
In all STABPAC models voltage adjustment is being done by varying a resistor chain (including a VOLTAGE ADJUSTMENT potentiometer). The output voltage is proportional to the resistance of the chain by 300 Ohm/volt.

By remote programming the function of the resistor chain will be exchanged to an externaly accessible programming resistor. By using different programming resistors swift changes between predetermined voltages can be performed.

Remote programming is done in the following steps:

1. Remove the connection between - and -SENS terminals.
2. Check voltage range.
3. Calculate a programming resistor as described below.
4. Connect the programming resistor between - and PROGR. terminals. (If remote sensing also is used, connect programming resistor between the - terminal of the load and PROGR. terminal.)





CONSTANT CURRENT STABPAC

In many applications the user requires constant current in the load rather than constant voltage across it. This usually arises when for example feeding a magnetic coil.

STABPAC can be operated as a precision constant current source by using the same regulation system as keeps the output voltage constant. This circuit needs an external shunt resistor. The stability of this resistor will determine the stability of the current. When using this circuit, the power supply is connected so as to keep the voltage across the shunt resistor constant and thus also keeping the current in the load constant.

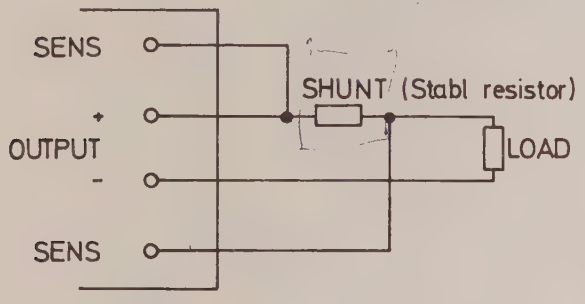


Fig.1

The output current is adjusted by the voltage control. Note that the current limit still acts as an over current protection circuit with a current – voltage characteristics as below.

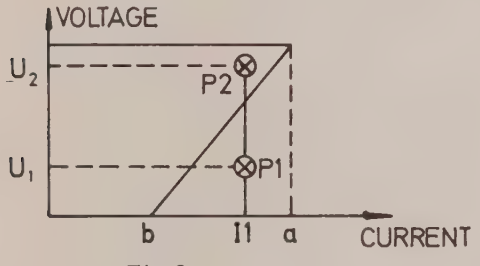


Fig.2

If it is necessary to operate with a low voltage and a high current (> b) as in point P1 in fig 2 this can be done by adding a resistor in series with the load. It is then possible to have a higher output voltage according to P2 in fig 2.
See also fig 3 below.

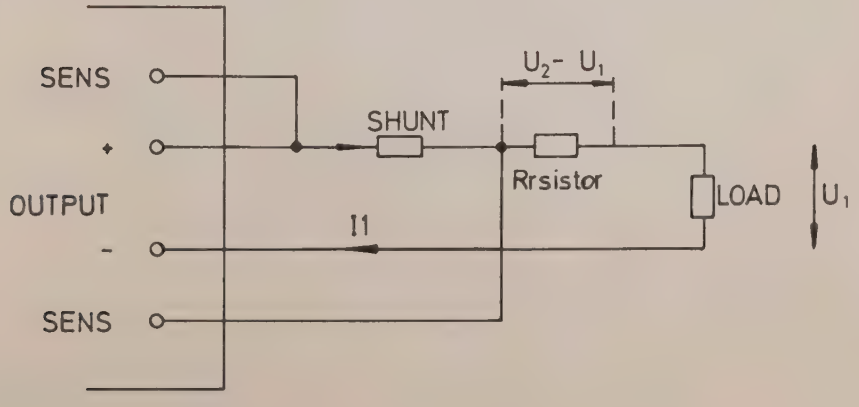


Fig.3

ELTRONIX

STABPAC 15

160-34-1

TYP	TR (x	R70	R81	R82	R90	R91	F1	D80	P90	C80	C90	C70
MB/MD5,5-2	T154	0,22	820	2,2K	1,2K	-	2A	B80C2200	1K	2x2500uF 15V	250uF 16V	2,2nF
MB/MD8 - 1	T119	0,51	10K	4,7K	-	10K	1,5A	1N4003	5K	2x1000uF 35V	100uF 40V	-"-
MB/MD15- 1	T119	0,51	4,7K	4,7K	-	-	1,5A	-"-	5K	2x1000uF 35V	100uF 40V	-"-
MB/MD32-0,48	T118	1,0	12K	15K	-	-	1A	-"-	11K	2x 500uF 64V	100uF 40V	-"-
MB/MD60-025	T112	2,2	27K	47K	-	-	0,5A	-"-	25K	2x 250u 100V	25uF100V	-"-
MB/MD120-012	T112	4,7	47K	150K	-	470K	0,5A	-"-	50K	2x 250u 100V	12,5uF160V	1nF

x/ Alt. Elab 20103

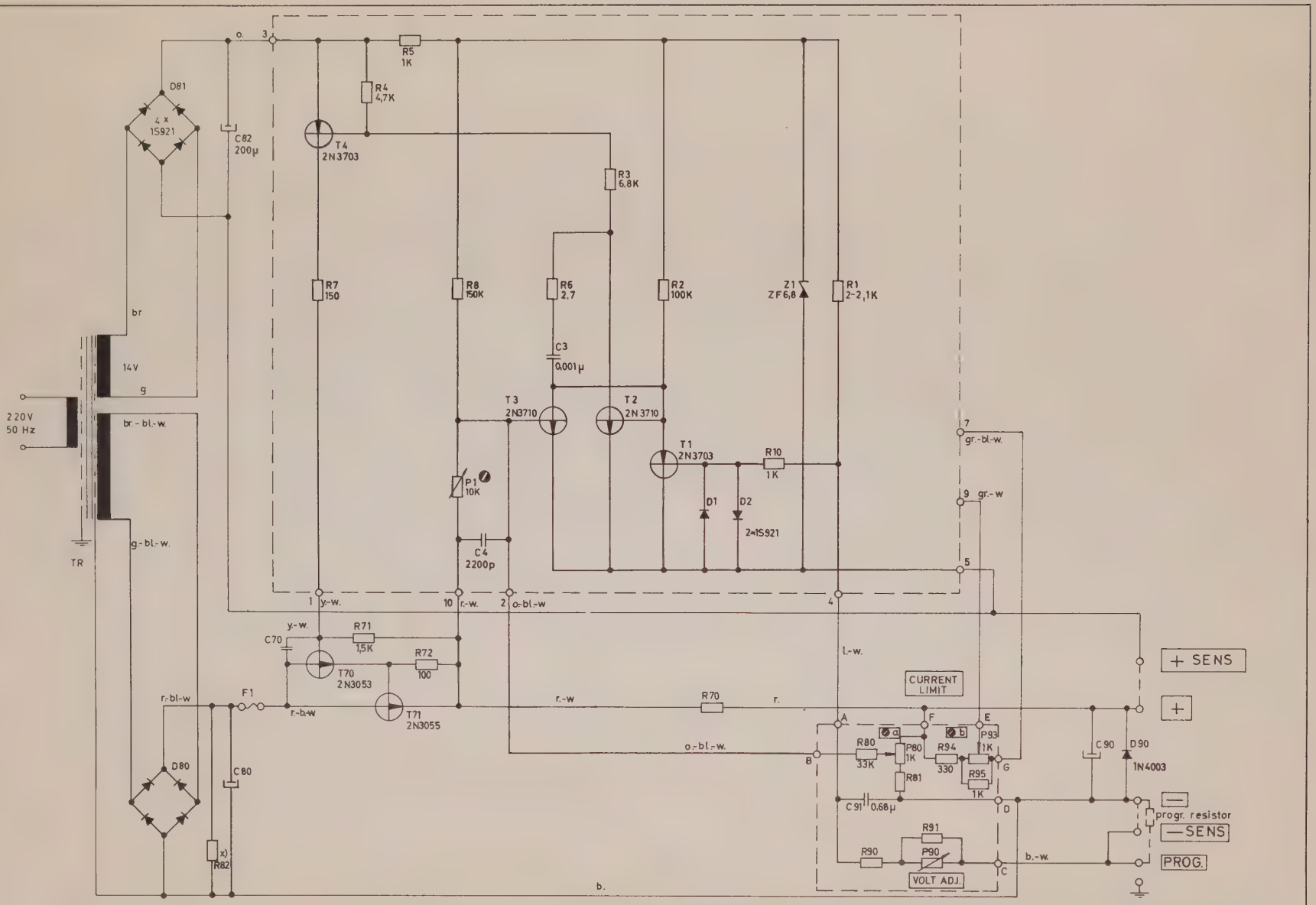
D80 4x1N4003

D90 1N4003

R75 -

C75 -

R93 -



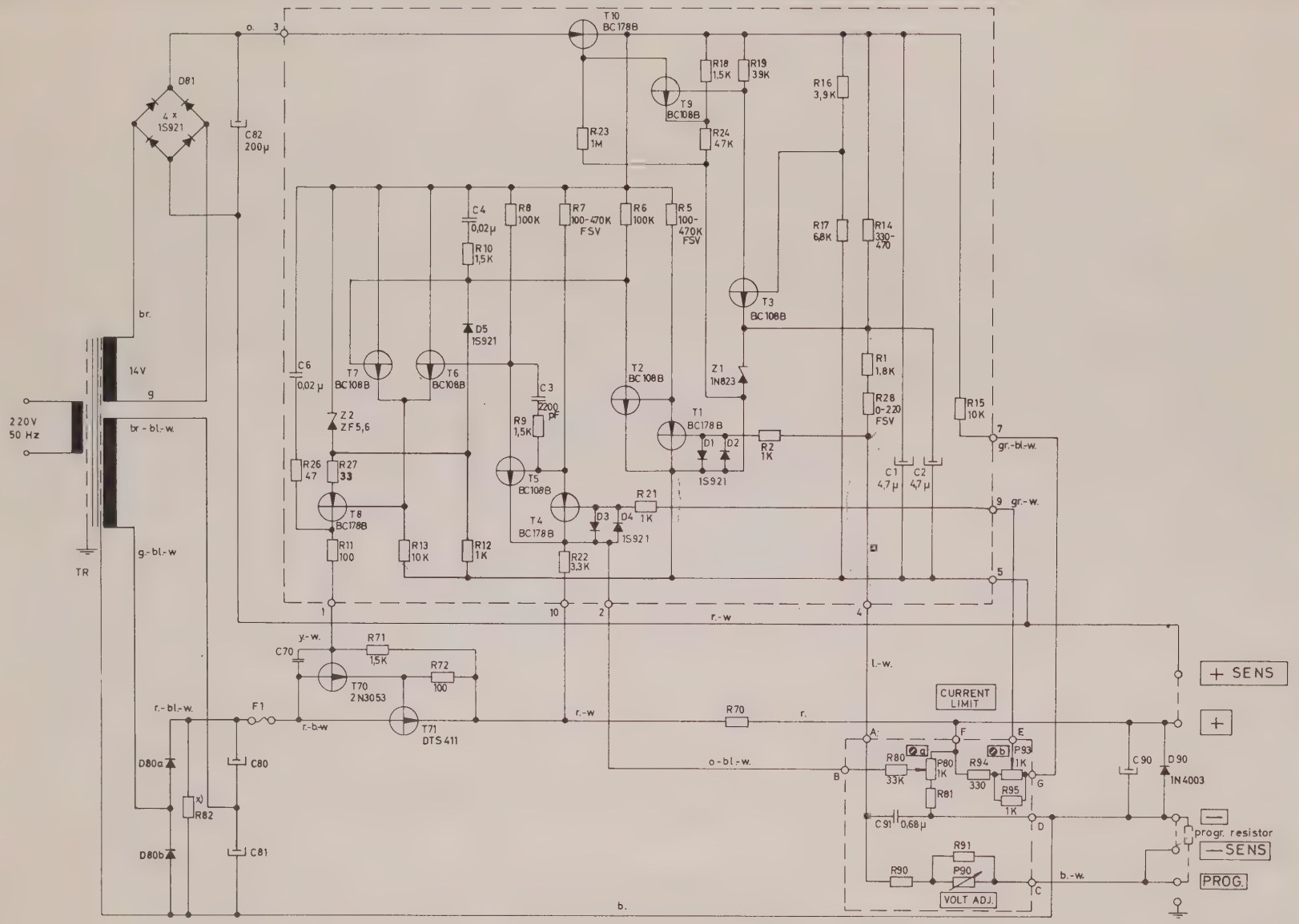
OLTRONIX

REGULATED POWER SUPPLY
STABPAC 15 MD5,5-MD60
STABPAC 30 MD8-MD60

16 09 69 | PG

160-73-7

Rev(1) 270270PG



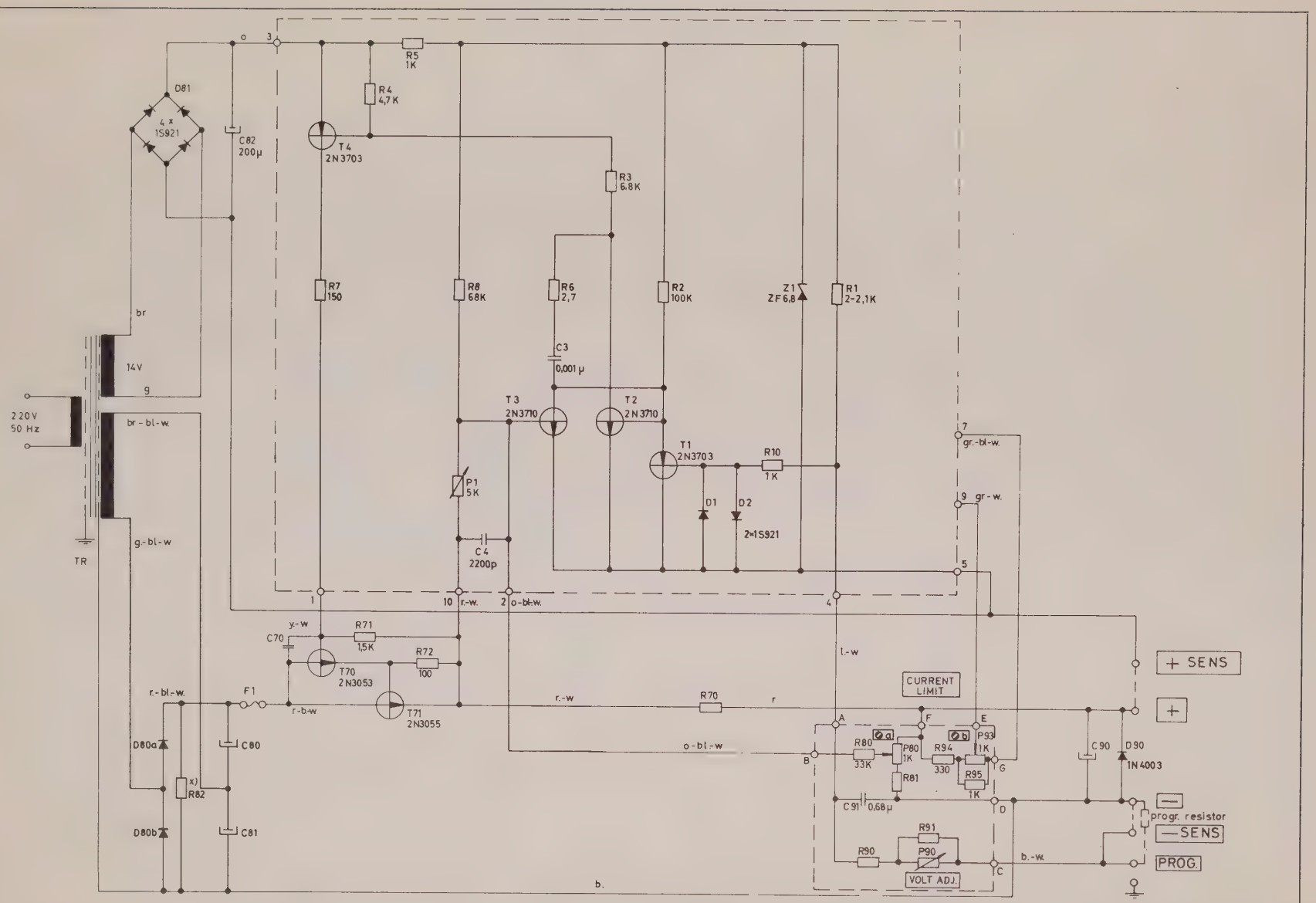
x) Stabpac 15 only

OLTRONIX

REGULATED POWER SUPPLY
STABPAC 15,30
MB 120

16 09 69 | PG

160-73-8

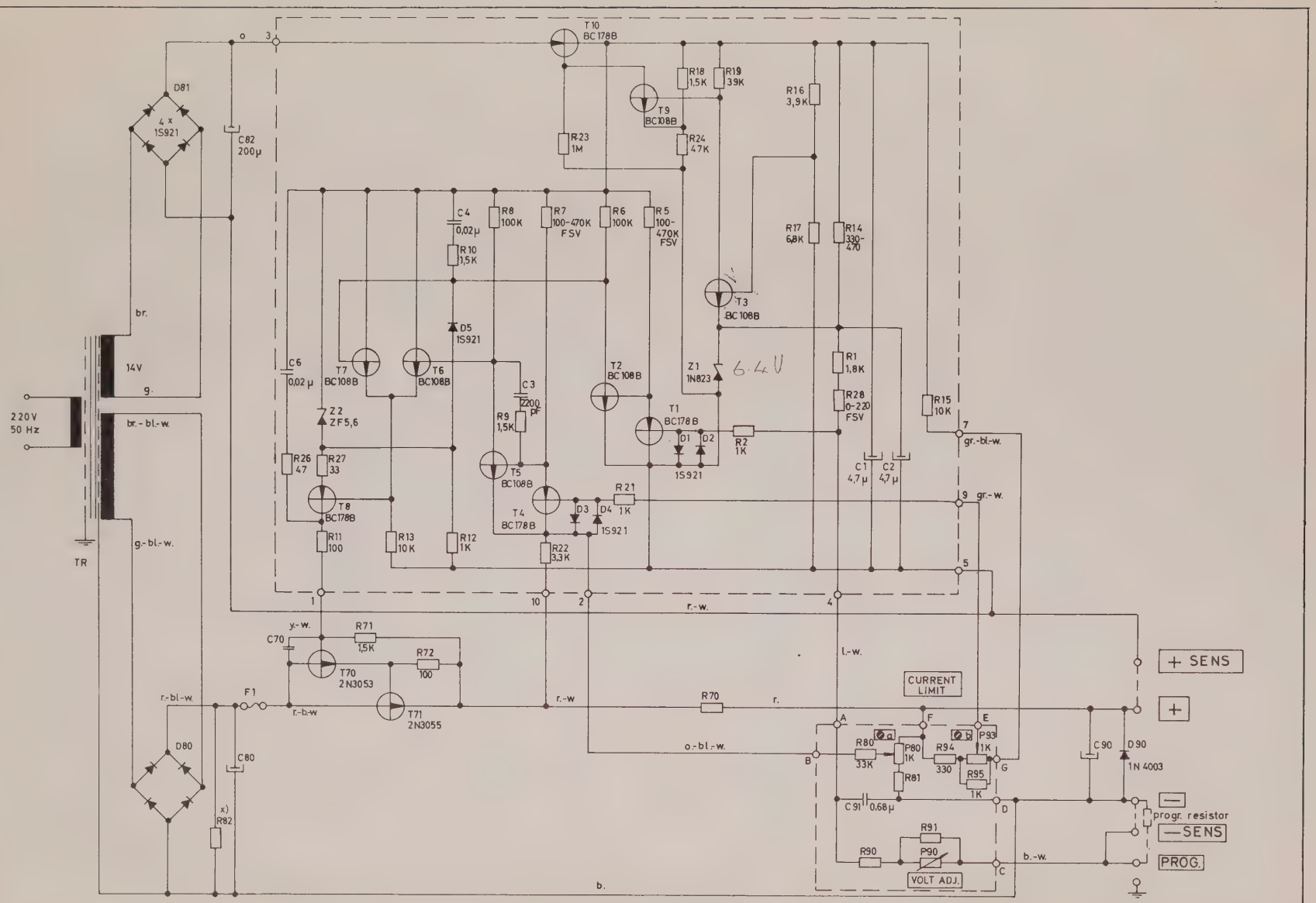


x) Stabpac 15 only

OLTRONIX

REGULATED POWER SUPPLY
STABPAC 15,30
MD120

16 09 69	PG
160-73-9	



x) Stabpac 15 only

OLTRONIX

REGULATED POWER SUPPLY
STABPAC 15 MB5,5-MB60
STABPAC 30 MB8-MB60

16 09 69 | PG

160-73-10

OVP

The Over Voltage Protection circuit senses the output voltage.

In case this voltage exceeds a preset value the power supply output is immediately short circuited in order to protect the load.

In case the over voltage is caused by a fault in the power supply e.g. a short circuited series transistor, the fuse located under the top cover is blown.

To reset: Disconnect the load. Replace the fuse (do not use slow blow type) and find out what has caused the OVP to trigger. The fault is probably to find in the Stabpac.

If the over voltage is caused by any other reason e.g. the output voltage, adjustment is set above the protection level, the power supply output is again short circuited, but the current limit switches in saving the fuse.

To reset: Find out what has caused the OVP to trigger, switch off the line for a few seconds, and the Stabpac is in working condition again.

Adjustment:

The protection level should be chosen at least 10 % or 1,5V, whichever is greater, above the operating voltage.

1. Set the OVP potentiometer fully clockwise, and the output voltage to desired protection level.

2. Turn the OVP potentiometer slowly counterclockwise until the output voltage suddenly decreases to approx. 1V.

3. Switch off the line, turn the Stabpac voltage adjustment slightly counterclockwise. Switch on.

4. Turn the voltage adjustment slowly clockwise and check that the output voltage disappears when it reaches the protection level.

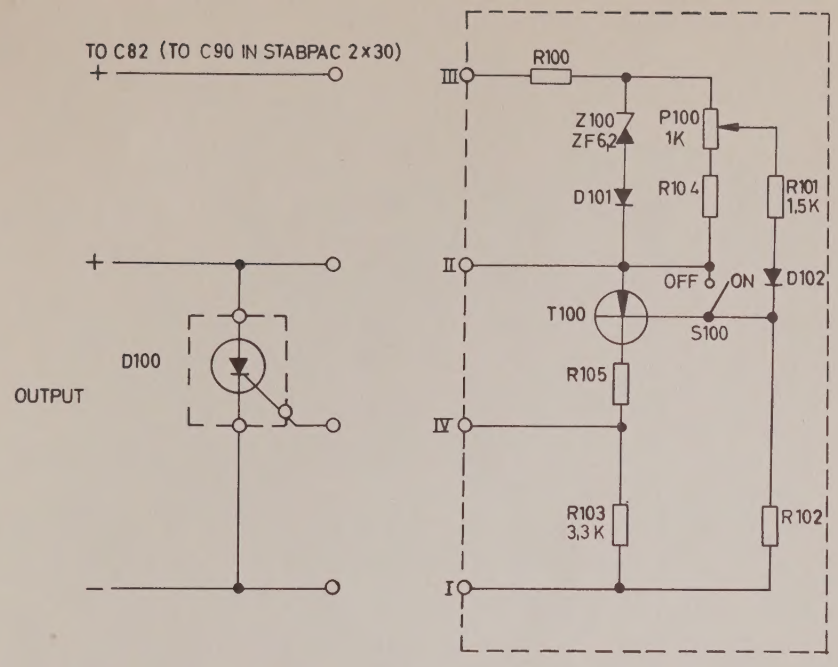
5. Repeat 3) and set the desired output voltage.

The OVP can be switched off on Stabpacs with serial numbers after.

Stabpac	15	861	Stabpac	2 x 30	516
"	30	526	"	90	772
"	45	641			

The OVP of these instruments can be identified by an "OFF" screened at the fully clockwise position on the OVP control potentiometer.

To switch off the OVP turn the OVP potentiometer fully clockwise.



MODEL	VOLT Min	VOLT Max	COMPONENTS Part no.	COMPONENTS Partslist	D100 Part no.	D100 Name	OVP Part no.
STABPAC 15 & 30							
5,5V	5	8	9181	106-24-18	1702	2N3228	0352
8 V	2	12	9182	106-24-19	"	"	0353
15 V	3	20	9183	106-24-20	"	"	0354
32 V	6	42	9184	106-24-21	"	"	0355
60 V	8	75	9185	106-24-22	"	"	0356
120 V	10	140	9186	106-24-23	"	"	0357
STABPAC 45 & 90							
4 V - 6 V	5	8	9181	106-24-18	2939	MCR649-3P	0358
9 V	9	12	9187	106-24-24	"	"	0359
12 V - 18 V	12	24	9188	106-24-25	"	"	0360
24 V - 28 V	24	35	9189	106-24-26	"	"	0361
36 V - 48 V	35	63	9190	106-24-27	"	"	0362
60 V	60	76	9191	106-24-28	"	"	0363
STABPAC 2 x 30							
2x12 V & 2x15 V	12	20	9192	106-24-29	1702	2N3228	0364
2x24 V & 2x30 V	24	36	9193	106-24-30	"	"	0365

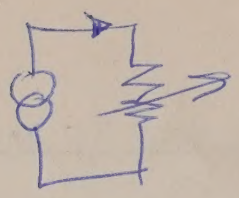
OLTRONIX	Over Voltage Protection STABPAC	21 10 69	PG
		106-74-13	

No	REVISION	DATE	APPD

COMPONENTS Part no	Part-list	VOLT	R100	R102	R104	R105	T100
9181	106-24-18	5-8	680	1,8K	1,5K	0	BC 178B
9182	-19	2-12	560	2,7K	100	0	BC 178B
9183	-20	3-20	560	4,7K	100	0	BC 178B
9184	-21	6-42	560	10K	100	0	2N 4037
9185	-22	8-75	560	18K	100	0	2N 4037
9186	-23	10-140	560	33K	100	0	2N 4037
9187	-24	9-12	680	2,7K	-	0	BC 178B
9188	-25	12-24	680	6,8K	1K	330	BC 178B
9189	-26	24-35	680	10K	3,3K	820	2N 4037
9190	-27	35-63	680	15K	1,5K	1,2K	2N 4037
9191	-28	60-76	680	18K	-	2,2K	2N 4037
9192	-29	12-20	820	4,7K	1,5K	330	BC 178B
9193	-30	24-36	1,5K	10K	3,3K	820	2N 4037

MODEL	MATERIAL	FINISH	
ELTRONIX	Over Voltage Protection	PART NO.	SCALE
		DR 20 01 70	APPD
		106 – 34 – 38	REV

30



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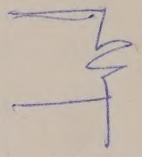

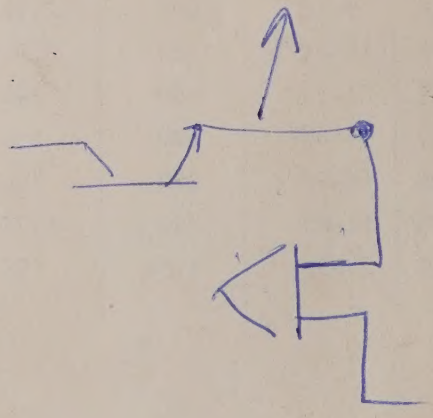

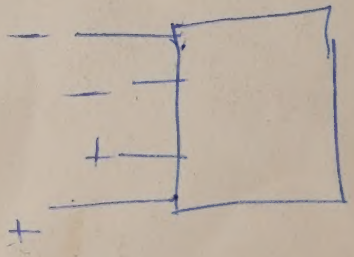

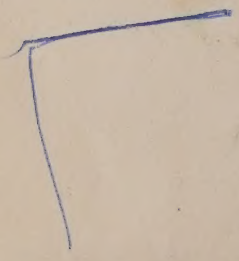

MP MASTER
MA23761